The table below is a partial list of companies that are currently providing wholesale loops and their areas of operations. The identified companies use a combination of digital microwave radio, SONET rings, and "dark fiber" for access to customer buildings, and are concentrated in more dense, urban areas.

TABLE 10: SELECTED CLECs PROVIDING WHOLESALE LOOP FACILITIES

CLEC	TECHNOLOGY	MSA RANKING OF LOCATIONS ( ) = # cities in MSA
MetroMedia Fiber Networks	Fiber Optics	1,2,3,4,5,6,9,10,11,13
Time Warner Telecom	SONET Fiber Rings	21,30
WinStar Communications	Digital Microwave	1(2), 2, 3, 4(2), 5(2), 6, 7, 8, 9(2), 10, 11, 15, 17, 26 (Planned - 1, 2, 3, 12, 13, 14, 16, 18, 20, 21, 24, 31)

See Appendix A for table sources.

C. Loop Alternatives Are Not Cost Prohibitive To CLECs

CLECs are opting for loop alternatives for several reasons. By providing their own loops, they are taking control of the delivery intervals and quality levels they provide to their customers. In addition, they are able to form partnerships and alliances that allow them to deploy loop functionality efficiently and economically. Michael A. Adams, the President of RCN's Technology and Network Development Group, has said that "RCN's unique ability to leverage its alliances with major players in the world of competitive communications and fiber optic network construction represents a significant advantage over both the incumbent phone and cable monopolies, and other competitive providers attempting to serve the residential market."[60] RCN's network "employs SONET ring backbone architecture and localized nodes built to ensure RCN's state-of-the-art fiber optics travel to within 900 feet of RCN customers, with fewer electronics and lower

[60] *RCN First Quarter Results Highlight Successful Execution of Its Residential Strategy*, PRNewswire, May 4, 1999.

maintenance costs than existing local networks."[61]

While not repeated here, the SONET cost and scalability analysis presented in the transport section of this paper is equally applicable to the loop.

D. CLECs That Choose Alternative Loop Sources Are Experiencing Robust Revenue Growth

The table below demonstrates that CLECs that choose alternative loop sources are experiencing robust revenue growth. The strategy of self-provisioning local loops, or purchasing them from a wholesale provider, is allowing CLECs to grow their customer base, and consequently their revenues.

Table 11: TOTAL REVENUE GROWTH OF SELECTED CLECS THAT PROVIDE THEIR OWN LOOP FACILITIES ($M)

CLEC	1995	1996	1997	1998	% Chg 95 - 98	1Q 1999
21st Century Telecom Group	n/a	n/a	n/a	.94	n/a	1.1
Cox Communications	1,286	1,460	1,610	1,717	33.5%	498.5
Electric Lightwave, Inc.	15.7	31.3	61.1	100.9	543%	38.2
e-Spire	1.2	9.4	59	156.8	12967%	58.1
GST Telecommunications	n/a	41.3	106	163.3	295%	55.7
MediaOne	2,374	2,955	5,043	2,882	21.4%	665
RCN	92.0	104.9	127.3	210.9	129%	67.4
Teligent	n/a	1.4	3.3	1.0	(28.6%)	1.5
Time-Warner Telecom	6.9	23.9	55.4	121.9	1667%	47.6
WinStar	29.8	68	79.6	244.4	720%	88.1

[61] *Id.*

V. Analysis of Operator Service and Directory Assistance Alternatives Available to CLECs

A. CLECs Are Providing Their Own OS/DA Functionality

A facilities-based CLEC is always able to build its own operator network. Switch hardware and software is modular and therefore flexible in matching the CLEC's service requirement. In many instances, OS/DA functionality can easily be added to and integrated with a CLECs' current switches. For example, both Nortel's DMS-500 and the LUCENT 5ESS-2000 switch can be upgraded to accommodate the addition of OS/DA functions. Moreover, equipment suppliers such as Volt Delta, pc-plus INFOMATIK, and IBM offer operator platforms, database systems, and/or search engines to support CLEC network rollout of basic and advanced Directory Assistance services. There are also suppliers that support specific areas of the Toll & Assist and Directory Assistance work functions, whose hardware and/or software can be efficiently and economically integrated into the CLEC's network and operation. With the addition of readily available work forces and building space, and the already guaranteed non-discriminatory access to ILEC databases, no CLEC is precluded from providing, or even wholesaling, OS/DA.

B. CLECs Are Obtaining OS/DA Functionality From Third-Party Vendors

Many CLECs have chosen to obtain OS/DA services from third-party service providers. The OS/DA technology that exists today provides third-party vendors with the capability to customize their services for each CLEC they serve. Companies providing such services include, but are not limited to, Southern New England (SNET), Sprint, BTI Telecom Services, Century Telecommunications Inc. (CTI), Excel Agent Services, and InteleServ. The major functions provided by these companies are Toll and Assist and National Directory Assistance. These functions are supported by flexible, complementary interfaces to call-related databases such as LIDB, SS7 networks, and intelligent network platforms. These network components can belong to CLECs and CLECs' service providers, as well as to ILECs and IXCs.

Likewise, many service providers offer turn-key systems with automated call processing capabilities. They also provide many options to brand and customize services. These capabilities are enabled by state-of-the-art operator service platforms, databases, and systems. They are supported by trained operator work forces that are available around the clock. CLEC end users can access these services via wireline and wireless network interfaces.

There is also some variety in the services that are available to CLECs. Some service providers specialize in a particular area and expand the product line vertically.

Most offer a full portfolio of services and features so that CLECs can choose this functionality as needed to fit their business and market plans. Due to the competitive nature of this business, flexible pricing arrangements and volume discounts are available.

The table below highlights some of the third-party providers that currently offer OS/DA services to CLECs.

TABLE 12: SELECTED THIRD-PARTY PROVIDERS OF OS/DA SERVICES

SERVICE PROVIDER	SERVICES PROVIDED	GEOGRAPHY
SNET	Directory Assistance Operator Services	National and Local (Connecticut)
Sprint	Operator Services	Available for customer lines within all local exchanges served by 7 RBOCs, GTE, and Sprint
HebCom	Directory Assistance Operator Services	Local and National DA
InfoNXX	Directory Assistance	National
McLeodUSA	Directory Assistance Operator Services	11 Midwest and Rocky Mountain states
Frontier Communications	Directory Assistance	National
CTI	Directory Assistance Operator Services	Local and National DA
Excell Agent Services	Directory Assistance Operator Services	Local and National DA
InTeleServ	Directory Assistance Operator Services	National
HorizonTelcom	Directory Assistance Operator Services	National
Teltrust, Inc.	Directory Assistance Operator Services	National
Metro One Telecommunications	Directory Assistance	National

C. OS/DA Service Providers That Serve The CLEC Market Are Growing

The OS/DA service providers that cater to the CLEC market are experiencing significant growth as a result of CLEC demand for their services. Table 13 below highlights the revenue growth of some of these companies.

TABLE 13: TOTAL REVENUE GROWTH OF SELECTED PROVIDERS OF OPERATOR SERVICES & DIRECTORY ASSISTANCE ($M)

Company	1995	1996	1997	1998	% Chg. 95-98	1Q 1999
SNET	1,515.2	1,546.0	1,543.5	Not Available	2% 95-97 only	Not Available
Sprint	12,765.1	14,044.7	14,873.9	Not Available	14% 95-97 only	Not Available
HebCom[62]	2,988.1	3,612.3	4,467.7	5,145.3	72.2%	1,374.0
McLeodUSA	29.0	81.3	267.9	604.1	1,983.1%	181.1
Frontier Communications	2,144.0	2,575.6	2,352.9	2,593.6	21.0%	675.0
CTI[63]	644.8	749.7	901.5	1,577.1	144.6%	414.3
Excell Agent Services	Not Available -- Privately Owned					
InTeleServ	Not Available -- Privately Owned					
HorizonTelcom	34.6	38.0	37.1	41.2	19.1%	11.7
Teltrust, Inc.	33.9	41.1	57.0	132.0	289.4%	33.2
Metro One Tele-communications	13.1	17.8	26.1	45.1	244.3%	14.2

[62]Hebcom is a subsidiary of Comcast Corporation. Revenues are for Comcast.

[63]CTI is a subsidiary of Century Telephone Enterprises.

VI. Analysis Of Signaling Alternatives Available To CLECs

CLECs have alternatives to using the ILEC signaling networks and associated call-related databases. Some CLECs are opting to construct and manage their own SS7 networks, while others are obtaining the functionality from alternative sources. Whether they build their own networks or purchase services from another party, CLECs have a growing number of options available to them.

A. CLECs Are Providing Their Own Signaling Systems and Associated Databases

CLECs are constructing and managing their own SS7 networks with Signal Transfer Points and appropriate links from their switches. Tekelec -- a leading supplier of SS7 technology -- supplies Signal Transfer Points (STPs) to LECs, IXCs, Enhanced Service Providers (ESPs)and ISPs. From 1992 through the first quarter of 1999, CLECs purchased 32% of the Tekelec STPs sold to LECs. In 1997, CLEC purchases accounted for 23% of the total LEC purchases, growing to 45% in 1998. For the first quarter of 1999, CLEC purchases accounted for 62%.[64]

David Connor, Executive Vice President of Engineering and Chief Technical Officer of US LEC, explained his reasoning for purchasing a pair of STPs from Tekelec for 1999 deployment: "The STPs will give US LEC more control over network connections, and give us the capability to interface with Advanced Intelligent Network System components in the future. US LEC will no longer depend on other SS7 vendors to connect to the National SS7 network. More important, US LEC's direct connection to the SS7 network will give our customers the benefit of additional new products and increased network reliability. This is just one more step we are taking to make US LEC the best and most dependable choice for telecommunication services." [65]

CLECs are also going a step further and installing SS7 networks with connections to centralized support tables and databases. Depending on their market plans and customer base, they may also choose to install their own Advanced Intelligent Network platforms. CLECs can integrate their particular database strategies with the signaling network. Overall, CLECs choose the network elements they wish to deploy and interface those provided by others.

One company that has chosen to go this route is GST Telecommunications. In a

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[64] Information provided by Dean Glenn, Director of Business Development, Tekelec, May 1999.

[65] *US LEC Purchases Signal Transfer Points From Tekelec* US LEC Press Release (April 26, 1999), US LEC Website, www.USLEC.com/press/042699.

January 20, 1999 news release, Joe Basile, President and Chief Executive Officer of GST explains: "Owning and controlling our own SS7 network is a key step in our efforts to fully integrate our voice, data, and Internet services. With our own SS7 network we are reducing our reliance on third parties, increasing our speed to market for new services, lowering our operational network costs, and increasing our fraud protection capabilities."[66] Mr. Basile further referred to the advanced network and services that GST is deploying: "As one of the first telecommunications companies to formulate and implement a converged network, we are developing new operating rules . . . It is no longer practical for GST to rely on a third-party for control." [67]

For CLECs, the equipment suppliers for SS7 and AIN networks are the same as those used by RBOCs, ILECs, and IXCs. They include, but are not limited to, Tekelec, Nortel, Alcatel, Lucent, and Siemens. They also include newer players such as Ascend, IEX Corporation (NEXUS), and SummaFour (Cisco). In some instances, a CLEC can mix and match vendor elements because they are based on standard interfaces and protocols. As new products are announced, there is a growing emphasis on converged networks and IP telephony.

In sum, as the number and size of service providers continues to increase, more are building their own SS7 networks. There are many products available for providers that choose to self-provision. As CLEC and ISP networks converge on single networks, more service providers will have the same incentives as US LEC and GST to build and manage their signaling systems.

B. CLECs Are Obtaining Signaling and Call-Related Database Capabilities From Alternative Sources

An increasing number of CLECs are opting to obtain their SS7 functionality from alternative service providers. These service providers offer the CLECs nationwide access and interconnection to SS7 networks, access to and storage of telephone numbers, customer databases and related services, and call set-up and management. Specific capabilities purchased by CLECs include routing, access, transport, validation, storage, and fraud protection. Connections are made directly into a service provider's network, or through a gateway to other major networks and service providers. Interconnections are nationwide, with options for access to overseas databases and networks.

Service companies providing SS7 network connectivity do so via redundant, state-

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[66] *GST Telecommunications Completes SS7 Network Infrastructure* GST Communications, Inc. News Release (Jan 20, 1999), GST Website, www.gstcorp.com/investor.

[67] *Id.*

of-the-art Signal Transfer Points (STPs). STPs are located in different regions of the country, and are accessible to CLECs regardless of the state from which they offer service. In many instances, the SS7 service providers also offer the physical links to the SS7 network elements, with full provisioning and maintenance support. Initial access permits entry into the SS7 networks of other telecommunications service providers, including RBOCs/ILECs, IXCs, and wireless networks. Some CLECs are establishing business relationships with their service providers. For example, ICG Telecom has strategic agreements with its key communication service providers: "Through our partnership with Southern New England Telephone, ICG became the first CLEC with a nationwide SS7 network, an important component for interconnecting local telephone companies with long distance carriers."[68]

With SS7 access, these service providers connect the CLEC to call-related databases for the storage and retrieval of telephone number and customer-related data, including LIDB and 800 Service. For most providers, the portfolio also includes support for Local Number Portability, Customer Name Services, and Single Number Services. Connections are established with all necessary regional centers and databases. These capabilities are frequently built on Intelligent Network (IN) or Advanced Intelligent Network (AIN) platforms. There are a number of service providers that support the development, testing, and delivery of advanced and customized features for CLECs. This can be done in a secure service creation environment by the CLEC, with specialists from the service provider, or jointly. There are also options for CLECs to purchase AIN links to third-party service providers if they choose to use them. Thus, there are a number of choices of state-of-the-art service providers, as indicated in the table below.

TABLE 14: THIRD-PARTY PROVIDERS OF SS7, DATABASE, AND AIN SERVICES

PROVIDER	SERVICE	GEOGRAPHY
Illuminet	SS7 Network Service	National
	Call Related Databases	National
	AIN Services	National
SNET	SS7 Network Services	National
	Call Related Databases	National
	AIN Services	National

[68] *ICG Telecom Group Mission,* ICG Website, located at www.icgcom.com.

TABLE 14: THIRD-PARTY PROVIDERS OF SS7, DATABASE, AND AIN SERVICES		
GTE Intelligent Network Services	SS7 Network Services Call related Databases AIN Services and AIN links to 3rd parties	Access to/from most LATAs National National; IXC connections negotiated individually
BTI	SS7 Network Services	East coast focus, but can connect nationally
TNSI Telecom Division Services	SS7 Network Services LNP	National National plus Canada
NaviNet	SS7 for Internet Dial-up Applications	National
Revcom	Independent LIDB for CLECs; Supported with own SS7 network	National
Targus Information Corp	AIN Services (includes SS7 transport for services provided)	National

Significant growth in the number of CLECs has stimulated demand for SS7 Network, Call-Related Databases and Intelligent Network related services -- which has had a positive effect on the development of a competitive marketplace. Customer specific pricing and contracts are negotiated for these services. Discounts are usually provided based on the number of services provided and the volume of transactions. Because this is a highly competitive area with multiple players, pricing information is not publicly available.

The table below provides a sampling of the revenue growth for some of the service providers discussed above.

TABLE 15: TOTAL REVENUE GROWTH OF SELECTED PROVIDERS OF SS7, DATABASE, AND AIN SERVICES ($M)						
Company	**1995**	**1996**	**1997**	**1998**	**% Chg. 95-98**	**1Q 1999**
Illuminet	17.1	37.9	54.3	Not Available	217% 95-97	Not Available
SNET [69]	1,515.2	1,546.0	1,543.5	Not Available	2% 95-97	Not Available
BTI Telecom Services	114.5	148.8	194.9	212.6	85.7 %	56.1
TNSI Telecom Division Services [70]	41.4	52.3	63.3	101.9	146.1 %	38.2
NaviNet [71]	22.3	28.5	70.6	91.5	310.3 %	40
Revcom	Privately Owned					
Targus Information Group	Privately Owned					

[69]SNET merged with SBC Corp. In 1998.

[70]TNSI is a subsidiary of Transactio Network Servie and consolidated revenues are shown.

[71]NaviNet is a subsidiary of CMGI, Inc. and consolidated revenues are shown.

C. The Success Of CLECs In Deploying SS7 Alternatives Is Evident

The table below provides the revenue growth of selected CLECs that are taking advantage of the SS7 alternatives available in the marketplace today. It is evident from the information contained in the table that CLECs that use their own SS7 networks are growing at very rapid rates.

TABLE 16: TOTAL REVENUE GROWTH OF SELECTED CLECs THAT USE SS7 ALTERNATIVES ($M)

Company	1995	1996	1997	1998	% Chg. 95-98	1Q 1999
GST	n/a	41.3	106	163.3	295%	55.7
US LEC	n/a	n/a	6.5	84.7	1203%	36.2

VII. Analysis Of The Operations Support Systems Alternatives Available To CLECs

The FCC originally required the ILECs to provide CLECs an electronic gateway into their existing computer systems to facilitate timely pre-ordering, ordering, provisioning, and trouble administration of all UNEs.[72] In addition, the ILECs had to provide a method for the CLECs to render accurate billing information to the CLECs (and vice versa) in order to facilitate reciprocal billing. The system for providing access to repair, provisioning, and billing systems comprises a platform that is commonly referred to as Operations Support Systems. OSS functionality allows service representatives from a CLEC's customer care centers real-time access to these systems and enables them to respond to customer inquiries and demand on-line.

Today, there are OSS alternatives available to CLECs. CLECs are opting to utilize their own OSS gateway, or purchase OSS capability from third-party vendors. These platforms provide CLECs with a level of efficiency that is at least equal to the service offered to retail ILEC customers, and in many cases superior. Since there are viable alternatives for this network element, ILECs should be required to provide OSS unbundling only in those instances where CLECs use the OSS in conjunction with another ILEC service or element.

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[72] 47 C.F.R. §51.319(f)(1)(1998).

A. CLECs Are Opting For Vendor Provided OSS Functionality

Many CLECs choose to obtain their OSS functionality from one of the myriad of vendors that now supply the OSS features and functions required by CLECs to serve their customers efficiently and without service delays. Facilities-based CLECs, such as AT&T Local Services (formerly Teleport), have purchased hardware and software solutions from private vendors to help them manage their Customer Care Centers. They have incorporated Harris Corporation's Remote Test Unit (RTU) Models 105 and 107 and CTS-6000 Test Administration Systems into their collocation cages and customer sites in order to remotely perform testing of unbundled loops and trunks. The features of these units include thorough, accurate subscriber loop testing, automatic loop testing of the entire cable plant, automatic number identification, and office alarm monitoring.[73]

MCI, on the other hand, was an early user of Gensym's Intelligent OSS (G2), a second-generation platform that provides support of their complex and growing invoice and auditing needs. With G2, MCI could graphically represent the entire billing process, capture auditor knowledge through rules and procedures, and validate each step of the process. And France Telecom, France's leading telephone provider, implemented an intelligent OSS called Experviseur for better management of telephone network traffic. Also based on Gensym's G2 software, Experviseur receives alarms, filters out extraneous alarms, and proposes corrective actions to maintain the quality and operability of the network.[74] With Gensym's Intelligent OSS, levels of scalability are being achieved that meet today's demands and support the growth potential necessary for tomorrow. Other foreign carriers are utilizing Experviseur and other similar technologies.

Innovative cable companies that have elected to enter the telecommunications arena have built software that overlays their existing CATV service request, trouble administration, and network surveillance systems. Last year, MediaOne, the third largest cable provider in the United States, developed and deployed Enterprise Ticketing Engine (ETE), an overlay to their existing OSS network. ETE allows service attendants to better manage trouble ticket administration and initiate intrusive fiber and coax testing, and also provides a vehicle to track and manage customer service orders.[75] This overlay better positions MediaOne to offer telephone service successfully to its existing CATV base. Other cable companies have implemented similar internal or vendor provided solutions in preparing to enter the markets for voice and data services.

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[73] Harris Corp Website http://www.harris.com/test-mgmt/lts.

[74] *Gaining Competitive Advantage with Intelligent OSS* (Advertisement), tele.com (Dec.1998).

[75] Telephone Interview with former Operations Manager of MediaOne, Boston, Mass. (March 11, 1999).

B. Software Vendors Are Catering To The CLEC Market

Many software and hardware manufacturers have anticipated the expanded need for OSS solutions to satisfy the growing demands of CLEC customer bases. The development of Telecommunications Management Network (TMN) architectures, principles, and products across the telecom industry has eased the manufacturer's problem of integrating its software solutions into the ILEC legacy systems, and thus has created a fertile market for new OSS development.

For example, Telcordia, formerly Bellcore, will introduce the world's first comprehensive suite of carrier grade OSSs for Next Generation Networks within the next twelve months. Telcordia's OSS/NGN suite will assist CLECs in supporting automatic provisioning, service assurance, service activation, and network management. In anticipation of emerging technologies, the product will operate in "dual-mode" supporting both IP-based as well as circuit-based networks. In addition, Telcordia has recently announced a new software package -- MediaVantage® JumpStart,™ which is scheduled for release in the second quarter of 1999 -- that allows start-up CLECs to seamlessly integrate into an ILEC network. It provides a CLEC with rapid basic functionality, and allows for affordable, scalable growth.[76] The software runs on the Microsoft Windows NT® operating system, a common cost-effective LAN system used in many corporate environments. Telcordia has also partnered with Nortel Networks to develop a product that will help communications service providers transform their existing circuit-switched networks into hybrid packet networks through the integration of Telcordia's cross domain OSS.[77]

Lucent Technologies offers a suite of operations software solutions that support entire service management processes from network creation to service assurance and maintenance. ACTIVIEW® Service Management Software enables service providers to respond to customer requests more quickly, reliably, and at less cost by simultaneously checking, synthesizing, and processing thousands of customer requests.[78] Lucent also offers Service Ready™ Starter Solutions to start-up CLECs that are sized and priced appropriately for growing networks. These entry-level solutions have the same characteristics of the proven Lucent products that are used by large telecommunications service providers worldwide.[79]

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[76] http://www.telcordia.com/newsroom/pressreleases/981202jumpstart.html.

[77] clec.com,http://www.clec.com/latest/oss99/oss99story2.cfm.

[78]Lucent Technologies Website, http://www.lucent.com/OS/.

[79]*Release the Power of Your Growing Network..Service Ready™ Starter Solutions*, Lucent Marketing Communications Brochure, No 5319, Issue 02 (Jan. 1999) at 2 (see

As a CLEC's network expands, the software can be scaled to accommodate growth. Switched Access Remote Test System (SARTS) is an operations system that provides easy, accurate remote testing for an entire multi-vendor network ranging from one circuit to more than 100,000. The system can consolidate circuit testing and maintenance for both high-capacity digital services -- including private network, broadband, data, dedicated switched services, and intelligent network services -- and analog resources, such as twisted pair.[80] SARTS allows a CLEC to perform remote intrusive testing of its own local loops and switched access circuits, without assistance from the local exchange carrier.

Other OSS vendors, such as Saville, offer customer care solutions to CLECs. Saville CBP® provides telecommunications companies with the ability to achieve total customer management. Modules of Convergent Billing Platform address all aspects of customer care including Service Order Management, Marketing, Discounting, Event Processing Manager, Billing, Post Billing, and Product Ordering. All of these modules work together to create a customer-specific database. Saville CBP® achieves fully convergent customer management, at reasonable costs and without disrupting legacy systems.

Daleen's Billplex™ is a next generation convergent billing and customer care software solution that integrates billing, provisioning, and customer care for multiple usage-based systems. Daleen offers rapid system implementation and service maintenance while simultaneously controlling development costs.[81] Billplex's seamless scalability supports start-up operations through mature, established carriers. It enables providers the flexibility to initially offer a single or multiple services, as well as the ability to easily add services without requiring a technical redesign or a large development effort.[82] OnSite Access, a Clark, NJ based ISP, announced on January 25, 1999, that it has have selected the Billplex family of products: "By offering a consolidated billing service, OnSite Access will now provide cross-product discounts as well as a more flexible pricing structure to its customers."[83]

Eftia OSS Solutions, Inc. also offers a suite of scalable products to manage today's telecommunications networks. Eftia d.Scribe Inventory™ is designed to build and maintain comprehensive models of telecommunications networks, by accurately and efficiently

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www.lucent.com/software).

[80]Lucent Technologies Website, http://www.lucent.com/OS/, at 4.

[81]Daleen Technologies Website, http://daleen.com/billplex/bintro.html.

[82]*Id.*

[83]Daleen Technologies Website, http://www.daleen.com/in_the_news.

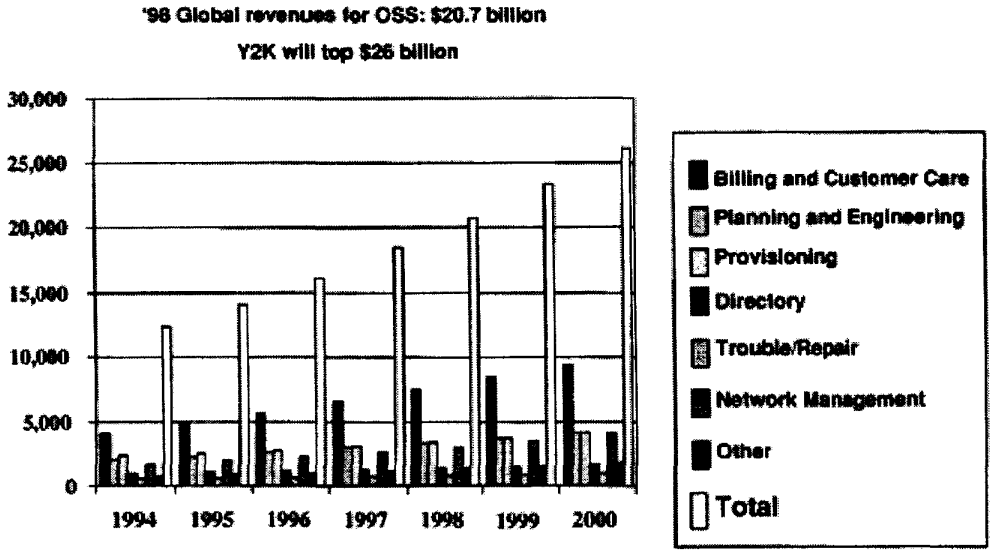
recording changes to transport facilities and network elements as they are implemented.[84] d.Scribe™ tracks consumed and available bandwidth, identifies circuit relationships, and incorporates relevant site and device information. It provides instant access to circuit information for all facility types, location information for all POPs, and device information for all network components -- including switches, MUXs, DSU/CSU, and CPE -- as well as device locations of shelved components, cards, and ports.

In addition, many software development companies have partnered with electronic gateway developers to offer off-the-shelf software solutions that can easily be integrated into an ILEC's OSS at reasonable costs. An example is the partnership between Beechwood, a provider of system integration expertise, and Daleen Technologies, the developer of BillPlex™ convergent billing and customer software. This relationship has resulted in elevated sales to CLECs.

The above product lines are all geared to accommodate the needs of the entry-level telecommunications company that provides all or some of their own network components.

[84]Eftia Website, http://www.eftia.com/solutions/telecom/invent.htm.

The graph below demonstrates the tremendous growth that has occurred and is expected to occur in the OSS industry. As indicated, global revenues for OSS are projected to exceed $18.5 billion in 1998. And by the year 2000, they are projected to exceed $26 billion, up from less than $12 billion in 1994.[85]



The Global OSS Market

The table below depicts an overview of several of the many manufacturers that have entered the market to provide OSS and/or gateway solutions to the CLEC, CAP, and CATV industries.

TABLE 17: MANUFACTURERS OF OSS/GATEWAY SOLUTIONS			
MANUFACTURER	**PRODUCT**	**MARKET**	**SOLUTION**
Harris Communications	HLTS, 105A and107A	Birch Telecom (CLEC), Aliant (ISP)	Remote XDSL Line Testing
Micromuse, Inc.	Netcool	Allegiance (CLEC), NTL, Inc. (ISP, CLEC)	Manage Voice and Data Switching Systems

[85] *OSS Interconnection: Breakthrough or Burden?* The 1999 Local Loop Comprehensive Report (ICC publication).

TABLE 17: MANUFACTURERS OF OSS/GATEWAY SOLUTIONS			
Intelligent Electronics and Eftia OSS Solutions, Inc.	MasterScribe	NewSouth, others (CLECs	Automatically schedule systems to Provision Service and manage Trouble Administration
Telcordia Technologies	OSS/NGN	Videotron (CATV)	Provisioning of Voice and Data over COAX, VOIP.
Ascend	Advantage Plus	CLECs, ISPs	On line self-help OSS to manage Ascend Hardware and Software Products
INRANGE	ClecT	CLECs	Network Monitoring System for SS7 Surveillance, Monitor and Test System for DS1 to OC3
DSET	ILEC in a Box	Ovation Communications (CLEC)	LSR Order Gateway and Local Service order Administration, E911, LIDB, and CNAM Gateways
Eftia	n.Scribe	PaeTec (CLEC)	Manages Phone Number Assignments in NPA-NXX
Wisor Telecom	C-LEC	CLECs	Order Management, Order Entry Inventory, Provisioning
ACE*COM	ACE*COM	CLECs	Number Administration Systems
ENA		CLECs	Bridge Between Newly Developed OSSs and Legacy Systems
PCR, Inc.	E-SYS	CLECs	Fully integrated OSS with Convergence Billing, Provisioning, and Customer Care Management
IBM		ICG Comm. (CLEC)	Customer Care and Billing System

TABLE 17: MANUFACTURERS OF OSS/GATEWAY SOLUTIONS			
BEA Systems	Weblogic Java OSS	Covad	Application Deployment, Online Service Upgrades
EDS	EDS Management	BTI (CLEC)	Billing and Product Management Software
Telcordia and Nortel	Next Generation Network OSS/Succession	Circuit based CLECs migrating to Data CLECs	Integrated Inventory Assignment, automating design and assignment of tasks across hybrid networks.
See Appendix A for table sources.			

Many of the solutions offered by the companies listed above also include support for new forward-looking technologies. For instance, the Harris Line Test System is an OSS that provides a full suite of test, installation, maintenance, and surveillance tools, and also offers Carrier Test Access Switch (CTAS) to test the viability of local loop conditioning for ADSL offerings.[86]

The above mentioned companies, and scores more, have developed solutions to better manage all the pre-ordering, ordering, provisioning, maintenance, and billing requirements of CLECs. As a result, CLECs have a host of methods to interact with the ILECs in all necessary areas. And many customer care software platforms are available. The platforms offer cost-effective, scalable solutions for CLECs that opt to purchase their own switches, interoffice connectivity, and local access.

VIII. CLECs Are Securing Funding From The Investment And Vendor Communities

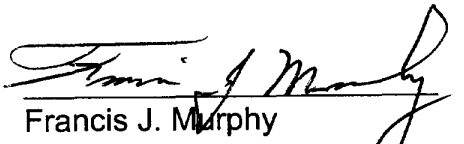
The success of CLECs that deploy their own infrastructures is evident in the massive amount of capital funding they are receiving from the investment and vendor communities. This funding is being provided by venture capitalists, equipment vendors, and through stock offerings and lines of credit. In addition, numerous partnerships are being formed between facilities-based CLECs and other companies. Attachment F highlights some of the investment and partnering activity that has occurred early in 1999.

[86]Harris Corp Website, http://www.harris.com/harris/whats_new/xdsl-comm.html.

These deals highlighted below have all transpired between the investment and vendor communities and CLECs that self-provision some or all of their network functionality. This attachment provides a clear indication that there is a high level of confidence in the viability of facilities-based CLECs.

I declare under penalty of perjury that the foregoing, which was prepared under my direction, is true and correct.

Executed on May 24, 1999.



Francis J. Murphy
President
Network Engineering Consulting, Inc.

APPENDIX A

Table 1: Selected Traditional CLECs Providing Their Own Switch Facilities

21st Century. http://stn.siemens.com/icn/news/1998/98060406.html. **Allegiance Telecom.** http://www.allegiance.com/body_Lucent.html. **AT&T Local.** http://www.tcg.com/tcg/media/PRcurrent/attfinal.html. **BayRing Communications.** http:www.bayring.com/company.htm. **Birch Telecom.** http://www.birchtel.com/020598.html. **Business Telecom, Inc.** http://www.btitele.com/new/release.cgi? **CapRock Communicaitons** www.caprock.com/pages/news?Caprokcfinal.htm;l **Electric Lightwave.** http://www.eli.net/about.html. **e.spire.** http://206.222.96.19/corporate/index.cfm. **FirstWorld Communications.** http://www.firstworld.com/news/archives/. **Florida Digital Network.** http://www.floridadigital.net/network.htm. **Focal Communications Corporation.** http://www.focal.com/prod_serv/telecom_serv.html. **Frontier Communications.** http://www.frontiercorp.com/about/news/199931-920305201.html. **GCI.** http://www.gci.com/about/index.htm. **GST Pacific.** http://www.gstcorp.com/products.html. **Hyperion Communications.** http://www.hyperioncom.net/html/products/. **ICG Communications.** http://www.icgcom.com/corporate/default.htm. **Intermedia Communications.** http://www.intermedia.com//products/services.html. **ITC^DeltaCom.** http://www.itcdeltacom.com/news/. **KMC Telecom.** http://www.kmctelecom.com/news/releases/feb4-99.html. **Justice Technology.** http://www.justicecorp.com/main/carrier/switch.htm. **McLeodUSA, Inc.** http://www.mcleodusa.com/BusinessProducts/default.html. **MCI WorldCom.** http://www.wcom.com/about_the_company/corporate_overview/. **MGC Communications.** http://www.clec.com/latest/ClecNesSearch.cfm. **NewSouth Communications.** http://www.newsouth.com/site91498/HTML/strategy.html. **NEXTLINK** www.nextlink.net/ra/info/racompback.ground.html. **Pac-West Telecom.** http://www.pacwest.com/company/overview.cfm. **PaeTec Comm.** http://www.paetec.com/WWWSite/network1.html. **US LEC.** http:///www.uslec.com/ **TelePacific.** http:///www.telepacific.com/docs/about.htm.

Table 2: Selected CLECs Providing Switches in Small MSAs

AT&T Local. http://www.tcg.com/tcg/media/PRcurrent/attfinal.html. **GCI.** http://www.gci.com/about/index.htm. **Hyperion Communications.** http://www.hyperioncom.net/html/products/. **KMC Telecom.** http://www.kmctelecom.com/news/releases/feb4-99.html. **McLeodUSA, Inc.** http://www.mcleodusa.com/BusinessProducts/default.html. **MCI WorldCom.** http://www.wcom.com/about_the_company/corporate_overview/.

Table 3: Selected CATV CLECs Providing Their Own Switch Facilities

Cablevision Systems (Lightpath). http://www.cablevision.com/cvhome/frame/. **Cox Telecom.** http://www.cox.com/telephone/ **MediaOne Telecommunications.** http://www.mediaone.com/products_services/ **RCN Corporation.** http://www.clec.com/latest/clecnews.cfm/rcn. **Time-Warner Telecom.** http://www.clec.com/latest/clecnews.cfm/time warner.

Table 4: Selected Wireless CLECs Providing Their Own Switch Facilities

AT&T Local. http://www.tcg.com/tcg/media/PRcurrent/attfinal.html. **McLeodUSA, Inc.** http://www.mcleodusa.com/BusinessProducts/default.html. **Teligent.** http://www.teligent.com/ **WinStarWireless.** http.www.clec.com/latest/clecnews.cfm. Keyword=winstar.

Table 6: Total Revenue Growth of Selected CLECs Who Provide Their Own Switching Functionality

Revenue Source: 21st Century Telecom Group. http://www.21stcentury.com/20.html, http://www.21stcentury.com/ 19.html. **Allegiance Telecom.**http://www.hoovers.com/premium/annuals/57346af.html. http:// www.hoovers.com/premium/quarterlies/57346qe.html. **Bell Atlantic Mobile.** http:www.edgar-online.com/bin/getsec/index.pl?doc=A-732712-0000950109-99-001134. http:www.edgar-online.com/bin/getsec/index.pl?doc=A-732712-0001036050-99-001035. **BellSouth Corporation.** http:www.edgar-online.com/bin/getsec/index.pl?doc=A-732713-0001047469-99-007204. http:www.edgar-online.com/bin/getsec/index.pl?doc=A-732713-0000732713-99-000006. **Birch Telecom** http://www.birchtelecom.com/020899.html. http://www.birchtelecom.com/051399.html. **BTI** . Consolidated Statements Of Operations. http://www.btitele.com/news/release/3/1/99.com. **Cablevision Systems (Lightpath)** http://www.hoovers.com/premium/premium/fin-tables/11792ft.html, http://www.cablevision.com/cvhome/cvabout/news/1q99.htm..**CommNet Cellular** www.hoovers.com/ premium/fin_tables/15401ft.html. **Cox Communications.** http:// www.hoovers. com/premium/ fin_tables/43269ft.html. www.hoovers.com/premium/quarterlies/ 43269ft.html. **Electric Lightwave** http://www.hoovers.com/premium/fin_tables/54535ft.html. www.hoovers.com/premium/ quarterlies/54535qe.html. **e-Spire.** http://www.2.espire.net/investor/ annualrpts/97annualreport/pages/ fiscal.cfm. **FirstWorld.** http://www.firstworld.com/news/archives/12-21-98.html. http://www.firstworld.com/newsSearch.cfh. http://www.firstworld.com/news/index.html. **Focal Communications** http://www.focal.com/news/1999/02/17/pr01.html. http://www.focal.com/news/1999/04/226/pr01.html. **Frontier Communications.** www.hoovers.com/premium/ fin_tables/11281ft.html. www.hoovers.com/premium/ quarterlies/11281ft.html. **GCI of Alaska (General Communications).**

http://gci.com/about/press/99_release.htm. http://gci.com/about/press/fin96.htm http://gci.com/about/ press/98_release.htm. **GST Telecommunications**. http://www.clec.com/latest/ ClecNewsSearch.cfm. **Hyperion Communications** http://www.hoovers.com/ premium/ fin_tables/52486ft.html. http://biz.yahoo.com, 5/21/99. **ICG Communications.** http://www.icgcomm.com/ investor/annual97/ annual97_page_19htm. http://www.clec.com/latest/ClecNewsSearch.cfm. **Intermedia Communications** http://www.hoovers.com/annuals/15637af.html. http://www.hoovers.com/annuals/ 15637qe.html. 1996 Intermedia Company Report. **ITC DeltaCom** http://www.hoovers.com/premium/fin_tables/ 54655ft.html. http://www.hoovers.com/premium/quarterlies/ 54655ft.html. **McLeodUSA** http://www.mcleodusa.com/investorrelations/98annualreport/financialhighlights.html. **MCI WorldCom.** http://www.hoovers.com/premium/fin_fintables/58340ft.html. http://www.hoovers.com/premium /quarterlies/58340ft.html. **MediaOne** http://www.hoovers.com/premium/ quarterlies/ 47905qe.html http://www.hoovers.com/premium/ fin_tables/47905qe.html **MGC Communications** http://www.hoovers.com/premium/ quarterlies/56573qe.html http://www.hoovers.com/premium/ fin-tables/56573qe.html **Pac-West Telecom** http://pacwest.com/company/newstand/qrtlyrpts/1Q99.cfm http://pacwest.com/company/newstand/qrtlyrpts/4Q98.cfm **RCN** http://www.hoovers.com/ premium/fin_tables/54614ft.html http://www.hoovers.com/ premium/quarterlies/54614ft.html **Teligent** http://www.hoovers.com/ premium/fin_tables/53894ft.html http://www.hoovers.com/ premium/quarterlies/ 53894ft.html. http://www.teligent.com/investor/TeligentARWeb/fdata97.asp **Time-Warner Telecom** http://www.hoovers.com/premium/fin_tables/56589ft.html http://www.clec.com/latest/ClecNewsSearch. cfm. **US LEC** http://www.hoovers.com/premium/fin_tables/56076ft.html http://www.hoovers.com/premium/quarterlies/56076qe.html **WinStar Communications** http://www.hoovers.com/premium/quarterlies/46398qe.html http://www.hoovers.com/premium/ fin_tables/46398ft.html

Table 7: Selected CLECs Providing Their Own Transport Facilities

Transport Alternatives: Allegiance. www.allegiancetele.com/in_the_news.html. **AT&T Local.** www.att.com/network/. **Bay Ring Communications.** www.bayring.com/company.htm. **Birch Telecom.** From "Birch Telecom Acquires Capital GBS Communications" Press release of March 5, 1999, www.birch.com/030599.html. **BTI Telecommunications Services, Inc.** www.btitele.com/fiber.html. **Cablevision Systems.** www.cablevision.com/cvhome/frame/fphone.htm. **Caprock.** www.caprock.com/pages/news/CRExpansion.html, www.caprock.com/pages/news/EnronFinalII.html. **Electric Lightwave.** From "Electric Lightwave, IXC Extend Networks With $178 Million Fiber Exchange", press release on 4/13/99. **e-spire.** www2.espire.net/press/index.cfm. **FirstWorld.** www.firstworld.com/networks/index.html. **Focal Communications.** www.focal.com/about/service_areas.html. **Frontier.** www.frontier.com/optronics/mapplication/. **FTV Communications.** From Williams press release dated 10-19-98 "Williams Network Expands West Coast by Nearly 1500 Miles in Fiber Exchange and Purchase". **GST Pacific.** www.willtales.com/network/pressreleases/rel65.html. **Hyperion Communications.** www.hyperioncom.net/html/corp/. **ICG Communications.** cgcomm.com/news/releases/1998. **Intermedia Communications.** www.intermedia.com/company/press. **ITC^DeltaCom.** www.deltacom.com/network_map.html. **KMC Telecom Corporation.** www.kmctelecom.com/cities/cities.html. **Level 3.** www.level3.com/CompanyNews/news_releases.html. **McLeodUSA, Inc.** www.mcleodusa.com/BusinessProducts. **MCI Worldcom.** www.lwcom.com/about_the_company/. **MediaOne Telecommunications.** www.mediaonegroup.com/whatweoffer. **PaeTec.** www.paetec.com/WWWSite/network(x).html. **Qwest.** www.qwest.net/network/mainmaps.html. **RCN.** www.rcn.com/investor/press, www.rcn.com/about_rcn/main_about_rcn.html. **Teligent.** www.teligent.com/about_our_network.asp.
Time-Warner. www.pathfinder.com/corp/fbook/fbcable.html. **Touch America.** www.tamerica.com/about_us. **WinStarWireless.** www.winstar.com/Newsroom_Display.html.

Table 8: Total Revenue Growth of Selected CLECs Who Provide Their Own Transport Facilities

Revenue Source: **Allegiance Telecom.**http://www.hoovers.com/premium/annuals/57346af.html. http:// www.hoovers.com/premium/quarterlies/57346qe.html. **Birch Telecom** http://www.birchtelecom.com/020899.html. http://www.birchtelecom.com/051399.html. **BTI** . Consolidated Statements Of Operations. http://www.btitele.com/news/release/3/1/99.com. **Cablevision Systems (Lightpath)** http://www.hoovers.com/premium/premium/fin-tables/11792ft.html, http://www.cablevision.com/cvhome/cvabout/news/1q99.htm. **CapRock Communications** http://www.hoovers.com/premium/annuals/ 58336af.html http://www.hoovers.com/premium/quarterlies/58336qe.html **Electric Lightwave** http://www.hoovers.com/premium/fin_tables/54535ft.html. www.hoovers.com/premium/ quarterlies/54535qe.html. **e-spire**. http://www.2.espire.net/investor/ annualrpts/97annualreport/pages/ fiscal.cfm. **Firstworld.** http://www.firstworld.com/news/archives/12-21-98.html. http://www.firstworld.com/newsSearch.cfh. http://www.firstworld.com/news/index.html. **Focal Communications** http://www.focal.com/news/1999/02/17/pr01.html. http://www.focal.com/news/1999/04/226/pr01.html. **Frontier Corporations.** http://www.hoovers.com/premium/ fin_tables/11281ft.html. www.hoovers.com/premium/ quarterlies/11281ft.html. **GST Telecommunications.** http://www.clec.com/latest/ ClecNewsSearch.cfm. **Hyperion Communications** http://www.hoovers.com/ premium/ fin_tables/52486ft.html. http://biz.yahoo.com, 5/21/99. **ICG Communications.** http://www.icgcomm.com/ investor/annual97/ annual97_page_19htm. http://www.clec.com/latest/ClecNewsSearch.cfm. **Intermedia Communications** http://www.hoovers.com/annuals/15637af.html. http://www.hoovers.com/annuals/ 15637qe.html. 1996 Intermedia Company Report. **ITC DeltaCom** http://www.hoovers.com/premium/fin_tables/ 54655ft.html. http://www.hoovers.com/premium/quarterlies/ 54655ft.html. **McLeodUSA** http://www.mcleodusa.com/investorrelations/98annualreport/financialhighlights.html. **MCI WorldCom.** http://www.hoovers.com/premium/fin_fintables/58340ft.html. http://www.hoovers.com/premium /quarterlies/58340ft.html. **MediaOne** http://www.hoovers.com/premium/ quarterlies/ 47905qe.html http://www.hoovers.com/premium/ fin_tables/47905qe.html **RCN** http://www.hoovers.com/ premium/fin_tables/54614ft.html http://www.hoovers.com/ premium/quarterlies/54614ft.html **Teligent**

http://www.hoovers.com/ premium/fin_tables/53894ft.html http://www.hoovers.com/ premium/quarterlies/ 53894ft.html. http://www.teligent.com/investor/TeligentARWeb/fdata97.asp **Time-Warner Telecom** http://www.hoovers.com/premium/fin_tables/56589ft.html http://www.clec.com/latest/ClecNewsSearch. cfm. **WinStar Communications** http://www.hoovers.com/premium/quarterlies/46398qe.html http://www.hoovers.com/premium/ fin_tables/46398ft.html.

Table 9: Selected CLECs Providing Their Own Loop Facilities

Source: AT&T http://www.clec.com/latest/directorybody.cfm?CompanyID=18 **Cox Communications** http://www.cox.com/Area/ **Electric Lightwave** http://www.clec.com/latest/ClecNewsSearch.cfm http://www.eli.net/home.html **e-Spire** http://www2.espire.net/index2.cfm http://www.clec.com/ latest/clecnews.cfm **GST Telecommunications** http://www.gstcorp.com/ locations.html http://www.clec.com/latest/ClecNewsSearch.cfm **Logix** http://cco.cisco.com/warp/public/146/ june98/17.html **MediaOne** http://www.mediaone.com/ http://www.clec.com/latest/clecnews.cfm **NextLink** http://www.nextlink.net/tx/nx1/nx1news.html http://www.nextlink.net/tn/tnstatemap.html http://www.nextlink.net/fl/flstatemap.html http://www.nextlink.net/pa/pastatemap.html http://www.nextlink.net/ca/castatemap.html http://www.nextlink.net/tx/txstatemap.html http://www.nextlink.net/ga/gastatemap.html http://www.nextlink.net/oh/ohstatemap.html **McLeodUSA** http://www.mcleodusa.com/ **RCN** http://www.rcn.com/ **Time Warner** http://www.twtelecom.com/ TimewarnerCities/index.html http://www.twtelecom.com/AboutTWC/index.html http://www.twtelecom.com/ProductsServices/index.html **Teligent** http://telegent.com/default-about.asp http://telegent.com/markey/pacific.asp http://telegent.com/market/midwest.asp http://telegent.com/market/west.asp http://telegent.com/market/east.asp http://telegent.com/market/ south.asp **Touch America** http://mpc.in-tch.com:30080/headlines/1999_Releases/02-22-99.html **Winstar** http://www.winstar.com/Home_Display.htm http://www.winstar.com/BuiServ_Display.htm http://www.clec.com/latest/body.cfm

Table 10: Selected CLECs Providing Wholesale Loop Facilities

Metromdia Fiber Networks www.clec.com/latest/CLECNewsSearch.cfm. **Time Warner Telecom** www.clec.com/latest/CLECNewsSearch.cfm.**WinStar Communications** www.winstar.xom/CarrServ_Display.htm.

Table 11: Total Revenue Growth of Selected CLECs Who Provide Their Own Loop Facilities

Source: 21st Century Telecom Group . http://www.21stcentury.com/20.html, http://www.21stcentury.com/ 19.html. **Cox Communications.** http:// www.hoovers. com/premium/ fin_tables/43269ft.html. www.hoovers.com/premium/quarterlies/ 43269ft.html. **Electric Lightwave** http://www.hoovers.com/premium/fin_tables/54535ft.html. www.hoovers.com/premium/ quarterlies/54535qe.html. **e-Spire.** http://www.2.espire.net/investor/ annualrpts/97annualreport/pages/ fiscal.cfm.. **GST Telecommunications.** http://www.clec.com/latest/ ClecNewsSearch.cfm.. **MediaOne** http://www.hoovers.com/premium/ quarterlies/ 47905qe.html http://www.hoovers.com/premium/ fin_tables/47905qe.html **RCN** http://www.hoovers.com/ premium/fin_tables/54614ft.html http://www.hoovers.com/ premium/quarterlies/54614ft.html **Teligent** http://www.hoovers.com/ premium/fin_tables/53894ft.html http://www.hoovers.com/ premium/quarterlies/ 53894ft.html. http://www.teligent.com/investor/TeligentARWeb/fdata97.asp **Time-Warner Telecom** http://www.hoovers.com/premium/fin_tables/56589ft.html http://www.clec.com/latest/ClecNewsSearch. cfm. **WinStar Communications** http://www.hoovers.com/premium/quarterlies/46398qe.html http://www.hoovers.com/premium/ fin_tables/46398ft.html

Table 12: Third-party Providers of OS/DA Services

SNET. Marketing Brochure: "The Human Connection". **Sprint.** http://www.sprintbiz.com/wsg/products/operator_services.html. **HebCom.** http://www.hebcom.com. **InfoNXX.** http://infonxx.com. **McLeodUSA.** Conversation with company representative. **Frontier Communications.** http://www.frontiercorp.com/products/index.html. **CTI.** http://www.cticallcenter.com/operatorservices.htm. and http://www.cticallcenter.com/directoryassistance.htm. **Excell Agent Services.** http://207.87.27.10/forbes/97/0224/5904080a.htm. **InTeleServ.** http://www.inteleserv.com/articles_pr3apr98.htm. **Horizon Telecom.** http://www.horizontel.com/chilltel/opsvc/index.htm. **Teltrust, Inc.** http://www.teltrust-inc.com/CONTACTS/cntmn.html. **Metro One Telecommunications.** http://www.metroone.com.

Table 13: Total Revenue Growth of Selected Providers of Operator Services and Directory Assistance

SNET. http://www.sec.gov/Archives/edgar/data/92244/0000092244-98-000011.txt. and http://www.sec.gov/Archives/edgar/data/92244/0000092244-98-000002.txt. **Sprint.** http://www.hoovers.com/annuals/11560af.html. **HebCom.** http://www.sec.gov/Archives/edgar/data/22301/0000950159-99-000039.txt. **McLeodUSA.** Http://www.hoovers.com/annuals/51489af.html. **Frontier Communications.** http://www.hoovers.com/annuals/11281af.html. **CTI.** http://www.sec.gov/Archives/edgar/data/18926/0000018926-99-000005.txt. and http://www.sec.gov/Archives/edgar/data/18926/0000906280-99-000078.txt. **Horizon Telecom.** Conversation with company representative and excerpts from serveral financial documents. **Teltrust, Inc.** http://www.hoovers.com/annuals/56971af.html. **Metro One Telecommunications.** http://www.hoovers.com/annuals/514000af.html.

Table 14: Third-party Providers of SS7, Database and AIN Services

Illuminet. Http:www.illuminetss7.com/local. **SNET.** hppt://www.snet.com/network. **GTE Intelligent Network Services.** http://www.gteins.net. **BTI Telecom Services.** http://www.btitele.com/services/carrier. **TNSI Telecom Division Services.** Http://tnsi.com/prodserv. **NaviNet.** http://www.clec.com/latest/clecnewsbody.cfm. **Revcom.** www.revcom.net. **Targus Information Group.** Http://phonedata.com

Table 15: Total Revenue Growth of Selected Providers of SS7, Database, and AIN Services

Illuminet. 10K/Q Reports. **SNET.** 10K/Q Reports. **BTI Telcom Services.** 10K/Q Reports. **TNSI Telecom Services.** 10K/Q Reports of Transaction Network Services. **Navinet.** Online Annual Report. Http://www.cmgi.com/main/html.

Table 16: Total Revenue Growth of Selected CLECs That Use SS7 Alternatives

GST Pacific. http://www.gstcorp.com/products.html. **US LEC.** http:///www.uslec.com/

Table 17: Manufacturers of OSS/Gateway Solutions

Harris Communications. http://www.commprod.harris.com/test-mgmt/lts/105a.html. **Metasolv.** www.metasolv.com/products.htm. **Micromuse.** www.clec.com/latest/newproducsbody.cfm(23-Feb-1999). **Intelligent Electronics.** "Eftia and IET Combine Services" from www.clec.com/latest/ newproductsbody.cfm (13-Jan-1999). **Telcordia.** www.telcordia.com/solutions/operations/dualmode.html. **Ascend.** www.ascend.com/3404.html. **INRANGE.** w ww.gsnetworks.com/clect/index.html. **DSET.** From Telecoms OSS BSS and In News, 26-April-1999. **Eftia.** www.eftia.com/solutions/index.htm and www.paetec.com. **Wisor Telecom.** www.wisor.com/news1.html. **ACE*COM** www.acec.com/usa.htm. **ENA** From "Enterprise Network Applications and Talarian Announce Strategic Alliance to Integrate Products," Press release. **PCR, Inc.** www.pcr.com/esys/modules.htm#operations. **IBM.** From Operational Service Support, Inner workings of Customer Migration. "ICG deploys new OSS systems from IBM", www.clec.com/latest/oss99. **BEA Systems.** From "Covad selects OSS vendor", 2-Feb-1999, CLEC.com Press Release. **EDS.** From "BTI deploying new provisioning software and billing services", 07-May-1999 CLEC.com press release. **Telcordia/Nortel.** From "Telcordia and Nortel team to market OSS products, by Eric Boles, advertising supplement to CLEC.com, May, 1999.

Summary of Attachments:

Attachment A: Evolution of the CLEC Industry

Attachment B: State and Metropolitan Area Data Book

Attachment C: Remote Switching Map - 650 Miles

Attachment D: DLC Switching Map - 125 Miles

Attachment E: SONET Ring Topology (Transport)

Attachment F: Summary of Funding and Partnering Activities